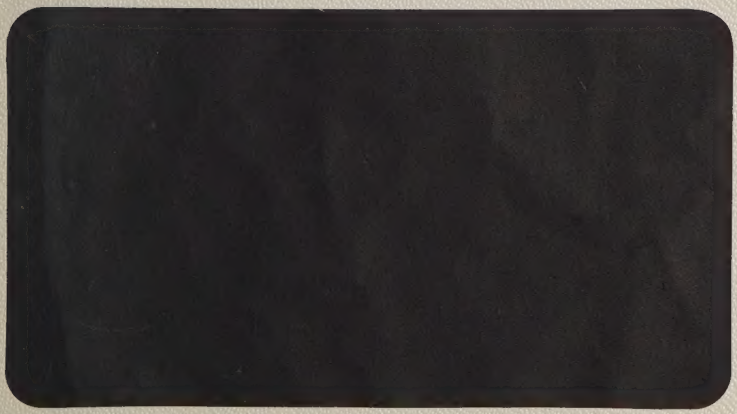
GenRad



Instruction Manual

Contents

Warranty ii
Specifications iii
Condensed Operating Instructions iv
OPERATION - Section 1
1.1 Purpose 1
1.2 Description 2
1.2.1 Calibration Chart 2
1.2.2 Earphone Coupler 2
1.2.3 Microphone 3
1.3 Parts Supplied 3
1.4 Initial Setup 3
1.5 Audiometer Acoustic Output Checks 6
1.6 Audiometer Attenuator Linearity Check . . . 10
1.7 Earphone Replacement 12
1.8 Calibration Precautions 12
1.8.1 Low Frequency Vibration 12
1.8.2 High Frequency Resonance 13
SERVICE - Section 2
2.1 GenRad Field Service 15
2.2 Instrument Return 15

GR 1560-9619 Audiometer Calibration Accessory Kit

Form 1560-0159

©Copyright 1977 GenRad, Inc.

Concord, Massachusetts, U.S.A. 01742
June, 1977

Warranty

We warrant that this product is free from defects in material and workmanship and, when properly used, will perform in accordance with applicable specifications. If within one year after original shipment it is found not to meet this standard, it will be repaired or, at GenRad's option, replaced at no charge when returned to a GenRad service facility. Changes in the product not approved by GenRad shall void this warranty. GenRad shall not be liable for any indirect, special or consequential damages, even if notice has been given of the possibility of such damages.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

GenRad policy is to maintain product repair capability for a period of ten years after original shipment and to make this capability available at the then prevailing schedule of charges.

Specifications

Description	Catalog Number
1560-9619 Audiometer Calibration Accessory Kit	1560-9619

FREQUENCY RANGE: 125 Hz to 8 kHz

ACCURACY: The electret-microphone response in a P83 NBS 9-A type coupler is calibrated to be equal to the response of a pressure microphone in an NBS 9-A type coupler when used to calibrate TDH-39, TDH-49, and TDH-50 earphones mounted in a MX-41/AR ear cushion.

MICROPHONE/COUPLER CALIBRATION: (Factory): ±0.2 dB, 125 Hz to 4 kHz; ±0.3 dB, 6 kHz to 8 kHz. System accuracy when used with a 1933-9700 or a 1982-9700 Sound-Level Meter (SLM) and the microphone supplied with the 1560-9619 and calibrated with a 1562 or a 1567 Sound Level Calibrator is within: 1.0 dB at audiometric test frequencies 125 Hz to 4kHz; 1.5 dB at audiometric test frequencies 6 kHz and 8 kHz.

EARPHONE COUPLER: The 1560-P83 9-A type coupler fulfills the volume requirements for the NBS 9-A type coupler specified in ANSI S3.7 1973 when used with the GR Type 1961-9601 Electret-Condenser Microphone. The volume is 5.633 cm^3 ±0.030 cm^3 including volume added by microphone. Axial Hold Force - 450 grams nominal.

MICROPHONE: GR 1961-9601 Electret-Condenser Microphone.

CALIBRATION CHART: Lists sound levels in nine steps from 125 Hz to 8000 Hz. Data supplied for an audiometer setting of 70 dB HL for TDH-39 earphone and for settings of 70 dB and 90 dB HL for the TDH-49 and TDH-50 earphones. SPL values on the chart include the pressure response data for the 1961-9601 one-inch Electret-Condenser Microphone supplied with the 1560-9619 Audiometer Calibration Accessory Kit.

CALIBRATION STAND: The 1560-9618 Audiometer Calibration Stand Assembly is a cast metal stand that provides support for the microphone, P83 9-A type coupler, preamplifier, and cable. The stand, when in use, is mounted on a polyethylene foam base (supplied) for isolation against structure-borne shock and vibrations during measurement.

ENVIRONMENTAL: 1961-9601 Electret-Condenser Microphone only, −20 to +55° C and 90% RH, operating.

SUPPLIED with 1560-9619:

1560-3120	Earphone Coupler (P83, NBS 9-A type)
1961-3200	Adapter
1961-3000	Microphone
1982-3500	Audiometer Calibration Stand Assembly
1560-0160	Calibration Chart
1560-0159	Instruction Manual

AVAILABLE: 1560-9618 Audiometer Calibration Stand Assembly — Supplied as part of 1560-9619 (1982-3500) — is also available as a separate unit.

MECHANICAL: 1560-9618 dimensions:

HEIGHT		DIAMETER		NET WT.		SHPG. WT.	
in.	mm.	in.	mm.	lb.	kg.	lb.	kg.
10	254	3.9	98	2.4	1.1	5	2.3

Condensed Operating Instructions

1560-9619 - Calibration Accessory Kit

1. Turn on the audiometer and set the HL dial for 70 or 90 dB as desired.
2. Remove the detachable preamplifier from the 1982 or the 1933 Sound-Level Meter (SLM) and thread to the one-inch microphone, supplied.
3. Insert the preamplifier connector end of the 10-foot extension cable up through the center of the Audiometer Calibration Stand Assembly. Feed the cable through the stand and attach to preamplifier. Position the cable, with microphone and preamplifier securely attached, in the stand until the microphone seats in the center. Connect the other end of the cable to the SLM.
4. Calibrate the one-inch microphone/SLM combination using a 1562 or 1567 acoustic calibrator. Select 500 Hz if the 1562 calibrator is used.
5. Place the 1560-9683 (P83) NBS 9-A type coupler on the microphone.
6. Remove either the left or right earphone from the audiometer and place on the coupler; observe that the earphone is correctly positioned in its MX-41/AR ear cushion and is centered on the coupler.

Operation – Section 1

1.1 PURPOSE

The purpose of the 1560-9619 Audiometer Calibration Accessory Kit (Figure 1-1) is to extend the measurement capabilities of either the 1933 or 1982 Precision Sound-Level Meter and Analyzer (SLM) to include audiometer calibration. The audiometer calibration system comprised of the 1560-9619 and either a 1982 or a 1933 SLM can accomplish the periodic calibration of audiometers of various manufacturers to the sound pressure levels specified in American National Standards Institute (ANSI) standard S3.6-1969 or other standards. The system uses an NBS 9-A type earphone coupler.

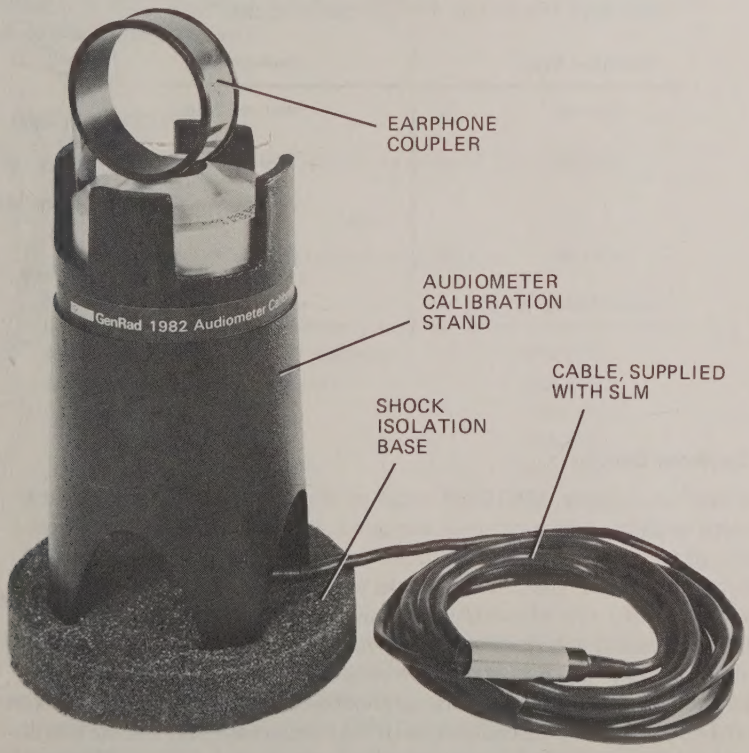


Figure 1-1. Audiometer Calibration Accessary Kit, 1560-9619.

1.2 DESCRIPTION

The 1560-9619 Audiometer Calibration Accessory Kit (Figure 1-1) consists of a shock-mounted stand which supports a one-inch electret-condenser microphone, microphone preamplifier, earphone coupler, and audiometer earphone. The microphone preamplifier is connected to a GR 1982 or 1933 SLM by means of a 10-foot cable supplied with the SLM. The kit includes a calibration chart which lists the sound pressure level values at standard audiometer frequencies for various earphones and the coupler pressure response corrections for the microphone.

1.2.1 Calibration Chart

The calibration chart, (1560-0160), supplied with the 1560-9619, lists the proper SLM indications in SPL for the TDH-39, TDH-49, and TDH-50 earphones. The data supplied are for an audiometer setting of 70 dB HL for the TDH-39 earphone and for settings of 70 dB HL and 90 dB HL for the TDH-49 and TDH-50 earphones. The data includes the corrections for the pressure response of the measurement microphone. Table 1-1 lists some of the earphones used by various audiometer manufacturers.

Table 1-1

EARPHONE TYPE USED ON VARIOUS AUDIOMETERS

Earphone Type	Audiometer
TDH-39	Beltone, Maico
TDH-49	Grason-Stadler 1701 and 1703 Also on some Maico & Beltone Models
TDH-50	Grason-Stadler 1702, 1703B, 1704, 1705, 1707, and 1721. GenRad 1937

1.2.2 Earphone Coupler

The earphone coupler, 1560-9683, supplied with the 1560-9619 couples the audiometer earphone to the one-inch microphone to evaluate the acoustic performance of the audiometer. This coupler meets the requirements specified for NBS 9-A type coupler. The coupler accepts the Telephonics TDH-39, -49, and -50 earphones fitted with MX-41/AR (or equivalent) ear cushion as well as the Permaflux PDR series and Western Electric 705-A earphones with their ear cushions. When the earphone is placed on the coupler, a tightly sealed chamber of specific volume is created between the earphone and the microphone. The volume in the chamber simulates the compliance of the human ear. This volume is optimized for the GR 1961-9601 Electret-Condenser Microphone. Table 1-2 lists the standards which the 1560-9683 coupler meets.

Table 1-2

EARPHONE COUPLER STANDARDS

Title	Organization	Number
Audiometers for General Diagnostic Purposes	ASA	Z24.5-1951
Pure - tone Audiometers for Screening	ASA	Z24.12-1952
Standard for Audiometers	ANSI	S3.6-1969
Standard for Couplers	ANSI	S3.7-1973
Standard Reference Zero for Calibration of Pure - tone Audiometers	ISO	389-1975

1.2.3 Microphone

The GR 1961-9601 one-inch Electret-Condenser Microphone (random incidence) is supplied with the 1560-9619. Coupler pressure response corrections are included on the calibration chart.

1.3 PARTS SUPPLIED

The parts supplied with the 1560-9619 are listed in Table 1-3.

Table 1-3

1560-9619 PARTS SUPPLIED

Part Description	GenRad Number
Audiometer Calibration Stand Assembly	1982-3500
Electret-Condenser Microphone (1")	1961-9601
Calibration Chart	1560-0160
Earphone Coupler	1560-9683
Microphone Adaptor (1" to ½")	1961-3200
Instruction Manual	1560-0159

1.4 INITIAL SETUP

The initial setup described in this paragraph refers only to the 1560-9619. Refer to the instruction manual for the 1933 or 1982 SLM and your specific audiometer to perform the necessary initial set-up procedures for these instruments. Perform the initial setup of the 1560-9619 as follows:

a. Seat the 1982-3500 Audiometer Calibration Stand Assembly (Figure 1-1) in its shock isolation base.

b. Refer to the instruction manual for the 1982 or the 1933 and perform the following steps:
   1. Remove and carefully store the microphone.
   2. Remove the preamplifier from the SLM.
c. Slide the female (black) end of the cable, 1933-0220, through the legs and up through the hole in the middle of the 1982-3500 Audiometer Calibration Stand Assembly. Using the thumbnail, depress the button on the clip on the black end of the 10-foot cable and slide the preamplifier on the cable.
d. Connect the male (silver) end of the 10-foot cable, 1933-0220 (supplied with SLM) to the SLM.
e. Carefully thread the one-inch microphone (supplied with the 1560-9619) to the preamplifier.

NOTE

Ensure that the 1961-3200 adapter is threaded to the microphone.

f. Carefully position the microphone and preamplifier in the holder in the Audiometer Calibration Stand Assembly.
g. Calibrate the system as follows:
   1. Set the SLM controls as indicated in Table 1-4.
   2. Ensure that the one-inch adapter is installed on the GR 1562 or 1567 calibrator.
   3. Turn the GR 1562 or 1567 on (See Figure 1-2). When the GR 1562 calibrator is used, select the 500 Hz frequency.
   4. Carefully fit the calibrator over the one-inch microphone.
   5. Adjust the SLM to indicate 114 dB.
   6. Remove and turn off the calibrator.
h. Position the 1560-9683 earphone coupler on the stand and ensure that it seats securely.
i. The system is now ready for use.

Table 1-4

SOUND–LEVEL METER CONTROL SETTINGS

1982		1933	
Control Name	**Setting**	**Control Name**	**Setting**
Power	ON	Power	ON
OCTAVE FILTER FREQ Hz	WTG	Octave BAND	WEIGHTING
DETECTOR	SLOW	METER	SLOW
WEIGHTING	FLAT	WEIGHTING	FLAT

Figure 1-2. Typical arrangement for calibrating the 1982 SLM with 1562 Calibrator.

1.5 AUDIOMETER ACOUSTIC OUTPUT CHECKS

The audiometer acoustic output check is a basic check performed to verify audiometer performance. Figures 1-3a and 1-3b show typical audiometer check-out hookups.

To perform the check, proceed as follows:

a. Accomplish the initial set-up procedure described in Paragraph 1.4.
b. Apply power to the audiometer and perform the initial set-up procedures recommended in the audiometer instruction manual.
c. Place the audiometer headset over the ears — observing the necessary precautions.
d. Set the audiometer frequency to 1000 Hz.
e. Increase the level of the audiometer tone from 0 dB HL to 90 dB HL (depress "Present" bar or other control to assure continuous output) and listen for abnormal clicks, distorted signals, or abrupt changes in level. Perform this test with each earphone.

> NOTE
>
> Step e will be performed differently on manual and automatic audiometers of various manufacturers. Refer to the appropriate instruction manuals for specific procedures.

f. If any unusual sounds are detected in step e, the audiometer can give erroneous results and should be checked for proper operation by a service center.
g. Remove the headset from the ears.
h. Refer to the audiometer instruction manual and remove the earphones from the headset.
i. Lift the retaining spring on top of the 1560-9683 coupler, and install the earphone and cushion on the coupler.
j. Release the spring and ensure that the earphone is centered on the coupler (Figure 1-3).
k. Set the audiometer tone interrupter switch to OFF.
l. If the SLM indicates above 61 dB in the FLAT response mode, move the test setup to a quieter location.
m. Refer to the audiometer instruction manual to determine which earphone type is used. Set the audiometer HL dial in accordance with Table 1-5.

Table 1-5

HL SETTING versus EARPHONE TYPE

Earphone Type	HL Setting
TDH-39	70 dB
TDH-49	70 dB
TDH-50	70 dB 90 dB (1703B)
Telex - 1470	70 dB

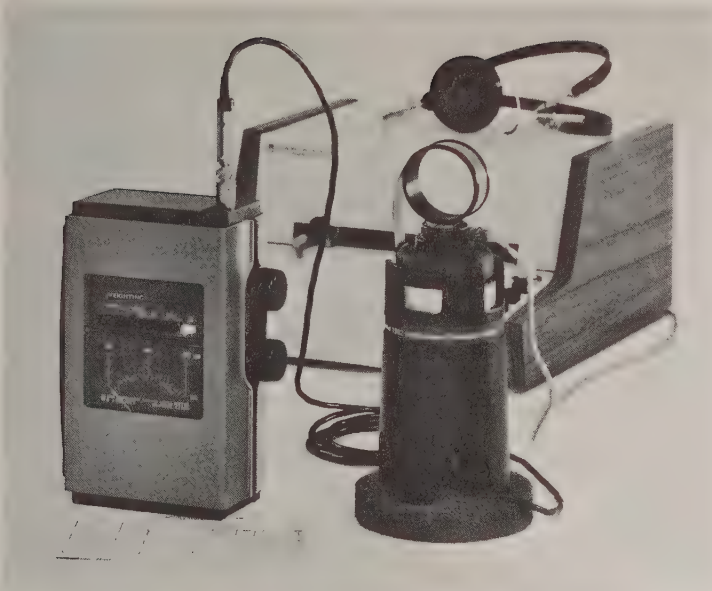


Figure 1-3a. Typical audiometer checkout hookup with 1933 SLM.

Figure 1-3b. Typical audiometer checkout hookup with a 1982 SLM.

n. Set the audiometer tone interrupter switch to produce a steady tone.
o. Start at 125 Hz and check the level for each frequency setting of the audiometer.

NOTE

It may be necessary to adjust the range control on the SLM to obtain an on-scale indication.

p. Record the results of Step o on a form similar to the one shown in Figure 1-4.
q. Compare the data in Step o with the desired levels on the calibration chart supplied with the 1560-9619. The reference standards are given in Table 1-6.
r. Perform Steps n through q for the other earphone.
s. If the recorded levels vary more than the tolerances specified in Table 1-7, the audiometer should be checked for proper operation by a service center.

Table 1-6
STANDARD AUDIOMETER SOUND–PRESSURE LEVELS* – SLM FLAT

Reference Standard	Hearing Level (HL)	Audiometer Frequency Setting in Hz									
		125	250	500	1000	1500	2000	3000	4000	6000	8000
ISO 389, 1975 and ANSI S3.6, 1969	70 dB (TDH-39)	115.0	95.5	81.5	77.0	76.5	79.0	80.0	79.5	85.5	83.0
ISO 389, 1975 and ANSI S3.6, 1969	70 dB (TDH-49)	117.5	96.5	83.5	77.5	77.5	81.0	79.5	80.5	83.5	83.0
	90 dB (TDH-50)	137.5	116.5	103.5	97.5	97.5	101.0	99.5	100.5	103.5	103.0
ISO 389, 1975 and ANSI S3.6, 1969	70 dB (Telex 1470)	115.0	95.0	80.0	73.0	73.0	74.0	75.0	76.0	77.5	79.0

*Sound-pressure levels in dB re 20 $\mu N/m^2$ for NBS 9-A coupler with earphone mounted in MX-41/AR ear cushion. Chart supplied with 1560-9619 includes microphone correction data. For earphones of other manufacturers, refer to Table 1-2.

Table 1-7
ALLOWABLE DEVIATION OF AUDIOMETER OUTPUT LEVEL FROM DESIRED LEVEL (ANSI S3.6 - 1969)

Frequency	Deviation
250 Hz to 3000 Hz	±3 dB
4000 Hz	±4 dB
Above 4000 Hz	±5 dB

AUDIOMETER ACOUSTIC OUTPUT TEST DATA

Audiometer Make _____ Earphone _____ Date _____

Model _____ Cushion _____ 1964 ISO Ref. ☐ Check One

Serial No. _____ SLM No. _____ 1969 ANSI Ref. ☐ Tester _____

Acoust. Cal. No. _____ Mic. No. _____ Other ☐

Earphone	Frequency of Audiometer (Hz)	125	250	500	1000	1500	2000	3000	4000	6000	8000
	HL Dial Setting — Audiometer										
Left (Blue)	Reading SLM-OBA										
	Desired Level Reading*										
	Deviation										
Right (Red)	Level Reading SLM-OBA										
	Desired Level Reading*										
	Deviation										

*From Calibration chart supplied — form No. 1933-0170.

AUDIOMETER ATTENUATOR LINEARITY TEST DATA

Audiometer _____ **Earphone** _____ **Tester** _____
Model _____ **Cushion** _____ **Date** _____
Serial No. _____ **SLM No.** _____ **ISO Ref.** ☐ **Other** ☐
Acoust. Cal. No. _____ **Mic. No.** _____ **ANSI Ref.** ☐ **Tester** _____

HL Dial Setting (dB)	Audiometer Frequency ( ) Hz			( ) Hz			( ) Hz		
	SLM-OBA Reading	Error Left	Error Right	SLM-OBA Reading	Error Left	Error Right	SLM-OBA Reading	Error Left	Error Right
100									
95									
90									
85									
80									
75									
70									
65									
60									
55									
50									
45									
40									
35									
30									
25									
20									
15									
10									
5									
0									

Figure 1-4. Suggested audiometer test data forms for use with 1933 or 1982 SLM.

1.6 AUDIOMETER ATTENUATOR LINEARITY CHECK

The 1560-9619, in conjunction with the 1982 or 1933 Precision Sound Level Meter and Analyzer, can be used to check the audiometer attenuator linearity within specific limits. Tables 1-8 and 1-9 document these limits for the 1933 and Tables 1-10 and 1-11 for the 1982. The tolerances for these values are listed in Table 1-7. It is recommended that all readings be taken with the SLM set to the appropriate octave band. To obtain the 6000 Hz indication, set the meter to the 8000 Hz band and subtract 0.5 dB.

To perform the audiometer attenuator linearity check, proceed as follows:

a. Perform the initial setup procedure described in Paragraph 1.4 and the acoustic output checks described in Paragraph 1.5.
b. Set the audiometer for an output level of 0 dB HL at 125 Hz.
c. Set the SLM to the 125 Hz octave band and set the range switch to obtain an on-scale indication.
d. Record the indication on a table similar to the one shown in Figure 1-4.
e. Refer to Tables 1-8 through 1-11 and step the audiometer attenuator through the various settings at the various frequencies. Each time the frequency is changed, select the appropriate octave band on the SLM.

Table 1-8

AUDIOMETER OUTPUT LEVELS VS HL DIAL SETTINGS – dB
TDH-49 OR -50 – ANSI S3.6-1969/ISO 389-1975 (Use with 1933 SLM)

HL Dial Setting	Audiometer Frequency – Hz				
	125	500	1000	6000	8000
100		113.5	107.5	113.5	113.0
95		108.5	102.5	108.5	108.0
90		103.5	97.5	103.5	103.0
85		98.5	92.5	98.5	98.0
80	127.5	93.5	87.5	93.5	93.0
75	122.5	88.5	82.5	88.5	88.0
70	117.5	83.5	77.5	83.5	83.0
65	112.5	78.5	72.5	78.5	78.0
60	107.5	73.5	67.5	73.5	73.0
55	102.5	68.5	62.5	68.5	68.0
50	97.5	63.5	57.5	63.5	63.0
45	92.5	58.5	52.5	58.5	58.0
40	87.5	53.5	47.5	53.5	53.0
35	82.5	48.5	42.5	48.5	48.0
30	77.5	43.5	37.5	43.5	43.0
25	72.5	38.5	32.5	38.5	38.0
20	67.5	33.5	27.5	33.5	33.0
15	62.5	28.5	22.5	28.5	28.0
10	57.5	23.5	17.5	23.5	23.0
5	52.5	18.5		18.5	18.0
0	47.5				

SLM readings in dB (FLAT) re 20 μN/m^2 to check attenuator of audiometer with TDH-49 or -50 Earphone. Reference threshold is ANSI S3.6-1969/ISO 389-1975 (Table 1-6). Use octave bands for low levels; use 8 kHz band and subtract 0.5 dB at 6 kHz.

Table 1-9

AUDIOMETER OUTPUT LEVELS VS HL DIAL SETTINGS – dB
TDH-39 – ANSI S3.6-1969/ISO 389-1975 (Use with 1933 SLM)

HL Dial Setting	Audiometer Frequency – Hz 125	500	1000	6000	8000
100		111.5	107.0	120.5	113.0
95		106.5	102.0	115.5	108.0
90		101.5	97.0	110.5	103.0
85	130.0	96.5	92.0	105.5	98.0
80	125.0	91.5	87.0	95.5	93.0
75	120.0	86.5	82.0	90.5	88.0
70	115.0	81.5	77.0	85.5	83.0
65	110.0	76.5	72.0	80.5	78.0
60	105.0	71.5	67.0	75.5	73.0
55	100.0	66.5	62.0	70.5	68.0
50	95.0	61.5	57.0	65.5	63.0
45	90.0	56.5	52.0	60.5	58.0
40	85.0	51.5	47.0	55.5	53.0
35	80.0	46.5	42.0	50.5	48.0
30	75.0	41.5	37.0	45.5	43.0
25	70.0	36.5	32.0	40.5	38.0
20	65.0	31.5	27.0	35.5	33.0
15	60.0	26.5	22.0	30.5	28.0
10	55.0	21.5	17.0	25.5	23.0
5	50.0	16.5		20.5	18.0
0	45.0				

SLM readings in dB (FLAT) re 20 $\mu N/m^2$ to check attenuator of audiometer with TDH-39 Earphone. Reference threshold is ANSI S3.6-1969 (Table 1-6). Use octave bands at low levels; use 8 kHz band and subtract 0.5 dB at 6 kHz.

Table 1-10

AUDIOMETER OUTPUT LEVELS VS HL DIAL SETTINGS – dB
TDH-49 OR -50 – ANSI S3.6-1969/ISO 389-1975 (Use with 1982 SLM)

HL Dial Setting	Audiometer Frequency – Hz 125	500	1000	6000	8000
100		113.5	107.5	113.5	113.0
95		108.5	102.5	108.5	108.0
90		103.5	97.5	103.5	103.0
85		98.5	92.5	98.5	98.0
80	127.5	93.5	87.5	93.5	93.0
75	122.5	88.5	82.5	88.5	88.0
70	117.5	83.5	77.5	83.5	83.0
65	112.5	78.5	72.5	78.5	78.0
60	107.5	73.5	67.5	73.5	73.0
55	102.5	68.5	62.5	68.5	68.0
50	97.5	63.5	57.5	63.5	63.0
45	92.5	58.5	52.5	58.5	58.0
40	87.5	53.5	47.5	53.5	53.0
35	82.5	48.5	42.5	48.5	48.0
30	77.5	43.5	37.5	43.5	43.0
25	72.5	38.5	32.5	38.5	38.0
20	67.5	33.5		33.5	33.0
15	62.5				
10	57.5				
5	52.5				
0	47.5				

SLM readings in dB (FLAT) re 20 $\mu N/m^2$ to check attenuator of audiometer with TDH-49 or -50 Earphone. Reference threshold is ANSI S3.6-1969/ISO 389-1975 (Table 1-6). Use octave bands for low levels; use 8 kHz band and subtract 0.5 dB at 6 kHz.

Table 1-11

AUDIOMETER OUTPUT LEVELS VS HL DIAL SETTINGS – dB
TDH-39 – ANSI S3.6-1969/ISO 389-1975 (Use with 1982 SLM)

HL Dial Setting	Audiometer Frequency – Hz				
	125	500	1000	6000	8000
100		111.5	107.0	120.5	113.0
95		106.5	102.0	115.5	108.0
90		101.5	97.0	110.5	103.0
85	130.0	96.5	92.0	105.5	98.0
80	125.0	91.5	87.0	95.5	93.0
75	120.0	86.5	82.0	90.5	88.0
70	115.0	81.5	77.0	85.5	83.0
65	110.0	76.5	72.0	80.5	78.0
60	105.0	71.5	67.0	75.5	73.0
55	100.0	66.5	62.0	70.5	68.0
50	95.0	61.5	57.0	65.5	63.0
45	90.0	56.5	52.0	60.5	58.0
40	85.0	51.5	47.0	55.5	53.0
35	80.0	46.5	42.0	50.5	48.0
30	75.0	41.5	37.0	45.5	43.0
25	70.0	36.5	32.0	40.5	38.0
20	65.0	31.5		35.5	33.0
15	60.0				
10	55.0				
5	50.0				
0	45.0				

SLM readings in dB (FLAT) re 20 $\mu N/m^2$ to check attenuator of audiometer with TDH-39 Earphone. Reference threshold is ANSI S3.6-1969 (Table 1-6). Use octave bands at low levels; use 8 kHz band and subtract 0.5 dB at 6 kHz.

1.7 EARPHONE REPLACEMENT

If both audiometer checks, Paragraphs 1.5 and 1.6, do not meet the specification, the problem may be caused by a faulty earphone. This is generally true if the problem exists in only one earphone. If a replacement earphone is available, perform the tests again with the replacement earphone. If the audiometer has a separate cable for each earphone, a quick check would be to plug the earphone cable into the other channel and perform the test again.

1.8 CALIBRATION PRECAUTIONS

1.8.1 Low Frequency Vibration

The combination of earphone and MX-41/AR ear cushion mounted on a NBS 9-A type coupler, is sensitive to vibration at approximately 100 Hz. Since the sound pressure level generated in the coupler by building vibrations can affect calibration, it is recommended that the 1982 Audiometer Calibration Stand Assembly should remain in its foam base when in use. To ensure calibration accuracy it is important that the SLM is set to the appropriate octave band for the frequency being tested.

1.8.1.1 Use of A-weighted Scale

The relative response of the A-weighted network can be used to reject low-frequency, structure-borne noise. Table 1-12 lists the correction values that are to be added to the 70-dB or 90-dB values shown on calibration chart, 1560-0160 for the earphone being calibrated. Accuracy of the corrections are listed and should be taken into consideration in calculating the overall calibration accuracy when using A-weighted measurements.

1.8.1.2 Use of Octave Band Filters

The octave-band filters in the 1982 or 1933 may be used to reject unwanted noise when calibrating an audiometer. Typical accuracy of measurements at standard audiometer frequencies that are centered in the octave band is ±0.5 dB with a guaranteed accuracy of ±1.0 dB.

Table 1-12

A-WEIGHTED CORRECTION DATA FOR 1933 AND 1982 SOUND LEVEL METERS

Frequency (Hz)	125	250	500	750	1000	1500	2000	3000	4000	6000	8000
Add (dB) Correction	−16.1	−8.6	−3.2	−1.0	0	+0.75	+1.2	+1.3	+1.0	0	−1.1
Typical Accuracy (dB) of Correction	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5
Guaranteed Accuracy (dB) ANSI S1.4 1971 Table 2	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	+1.5 −2.0	+1.5 −3.0

1.8.2 High Frequency Resonance

When an earphone is placed on a NBS 9-A type coupler, a resonance causes a repeatability problem when measuring the audiometer output at 6000 Hz (6 kHz). To limit these variations in measurements performed at different times to less than 2 dB, use extreme care when placing the earphone and cushion on the coupler and when lowering the spring on the 1560-9683 over the earphone. Also ensure that the coupler is properly seated on the microphone.

Service—Section 2

2.1 GenRad FIELD SERVICE

The warranty attests the quality of materials and workmanship in our products. When difficulties do occur, our service engineers will assist in any way possible. If the difficulty cannot be eliminated by use of the instructions in this publication please write or phone our service department (see back cover). Describe in detail the problem encountered, and the steps taken to remedy it. Be sure to mention the serial, ID, and type numbers of the instrument.

2.2 INSTRUMENT RETURN

Before returning this device to GenRad for service, please contact our Service Department or nearest District Office requesting a "Returned Material" number. Use of this number will ensure proper handling and identification. For instruments not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay.

GenRad

300 Baker Avenue
Concord, Massachusetts 01742

ATLANTA
Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee
1 Dunwoody Park, Suite 107, Atlanta, GA 30341
Tel: 404/394-5380

***BOSTON**
Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
(SALES)
Route 117, Bolton, MA 01740
Tel: 617/646-0550
(SERVICE)
300 Baker Avenue, Concord, MA 01742
Tel: 617/369-8770 • TWX: 710 347-1051

***CHICAGO**
Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wisconsin
1067 E. State Parkway, Schaumburg, IL 60195
Tel: 312/884-6900 • TWX: 910 291-1209

DALLAS
Arkansas, Colorado, Louisiana, New Mexico, Oklahoma, Texas, Wyoming
777 South Central Expressway, Suite 4-A, Richardson, TX 75080
Tel: 214/234-3357 • TWX: 910 867-4471

DAYTON
Kentucky, Indiana, Michigan, Ohio, Western Pennsylvania
3300 South Dixie Drive, Dayton, OH 45439
Tel: 513/294-1500 • TWX: 810 459-1785

***LOS ANGELES**
Arizona, Southern California, Hawaii, Nevada (Clark County only)
P.O. Box 19500, 17361 Armstrong Avenue
Irvine Industrial Complex, Irvine, CA 92714
Tel: 714/540-9830 • TWX: 910 595-1762

***NEW YORK**
Delaware, New Jersey, New York, Eastern Pennsylvania
380 Midland Avenue, Saddle Brook, NJ 07662
Tel: (NJ) 201/791-8990, (NY) 212/964-2722
TWX: 710 988-2205

SAN FRANCISCO
Northern California, Idaho, Montana, Nevada (except Clark County), Oregon, Washington, Utah
2855 Bowers Avenue, Santa Clara, CA 95051
Tel: 408/985-0662 • TWX: 910 338-0291

Alaska 907/279-5741

***WASHINGTON, DC**
Maryland, Virginia, West Virginia, (Washington, DC)
15 Firstfield Road, Gaithersburg, MD 20760
Tel: 301/948-7071 • TWX: 710 828-9741

CANADA
***GenRad, Ltd.**
307 Evans Avenue, Toronto, Ontario M8Z 1K2
Tel: 416/252-3395 • TELEX: 06-96724
Montreal 514/747-1052
Ottawa Zenith 88630

EUROPE, AFRICA, and NEAR EAST
***GenRad International AG**
P.O. Box CH-8034, Zürich, Switzerland
Tel: (01) 55 24 20 • TELEX: 854-53638
***Paris** (01) 797 07 39
***Milano** (02) 20 92 57
***München** (089) 40 18 01
***Bourne End (UK)** (06285) 2 66 11

***ASIA, PACIFIC, and LATIN AMERICA**
GenRad, Marketing & International Division
300 Baker Avenue, Concord, MA 01742
TWX: 710 347-1051 • TELEX: 92-3354
Cable: GENRADCO CONCORD (Mass)

*Service Facilities March 1977

Printed in USA

300 Baker Avenue, Concord, MA 01742